CLAIMS

What is claimed is:

1. A system for implementing a journal of a file system in a computer system which has a system bus, comprising:

a first memory for storing data representing the files of the file system;

a second memory; and

a first device coupled to the first memory and the second memory;

wherein in the case of an interruption to the file system, the first device is used to rebuild the file system,

wherein all updates to the file system are stored by the first device in the second memory,

wherein the first device transfers data between the first memory and the second memory without using the system bus.

2. The system of claim 1, wherein in the case of an interruption to the file system, no more than one call is made to the system bus for data transfer in a transaction.

3. The system of claim 1, wherein the second memory is a snapshot volume.

4. The system of claim 3, wherein the first memory is a file system volume.

5. The system of claim 4, wherein the first device is a storage controller mechanism.

6. The system of claim 5, wherein neither the first memory nor the second memory is connected to the system bus.

7. The system of Claim 6, wherein the storage controller includes a snapshot mechanism.

8. The system of claim 7, wherein the snapshot mechanism is integrated into the storage controller.

9.   A method of journaling or logging a file system, comprising:

resetting or deleting a snapshot after all application-level file system activity completes; and

initiating a transaction in which a snapshot of the current state is created of a file system volume in which the snapshot is made through hardware and in which, during the transaction, the file system operates normally.

10.   The method of Claim 9, wherein the method is implemented by a computer system in which a computer communicates to a storage controller during the transaction.

11.   The method of Claim 10, wherein the method is further implemented by a file system volume and a snapshot volume both of which are coupled to the storage controller.

12.   The method of Claim 11, wherein the transaction further comprises a series of read and/ or write operations on file system blocks containing either data or file system metadata.

13.   The method of Claim 12, wherein any read or write operation is directed to the storage controller for processing.

14.   The method of Claim 13, wherein any write operation directed to the storage controller causes a copy-on-write action within the storage controller.

15.   The method of Claim 14, wherein a copy-on-write operation is processed within the storage controller by first reading the original data from the file system volume, then writing said original data to the snapshot volume, and then overlaying said original data on the file system with new data.

16.   The method of Claim 15, wherein the method involves no more than one data transfer on the system bus per write operation.

17.   The method of Claim 16, wherein the snapshot mechanism is wholly contained within the storage controller and comprises a microprocessor, a memory, and either software or firmware.

18.   The method of Claim 17, wherein the file system did not originally have a journaling or logging capability and is being retrofitted to have this capability.

19.   The method of Claim 18, wherein software for the file system does not manage any form of sequential journal or log.

20. A method for journaling or logging a file system of a computer system, wherein software for the file system does not manage any form of sequential journal or log, comprising:

storing changes to the file system in hardware.

21. The method of Claim 20, wherein the hardware for storing changes to the file system is a snapshot mechanism in a storage controller.

22. The method of Claim 21, further comprising initiating a transaction in which a snapshot of the current state is created in the snapshot mechanism in which, during the transaction, the file system is operating normally and committing the transaction by resetting or deleting the snapshot after all application-level file system activity completes.

23. The method of Claim 22, further comprising making a roll back request from a host computer to a storage controller which causes any changes made during the transaction to be discarded, and the file system to be restored to its state just prior to the initiation of the transaction.

24. A method of journaling or logging a file system, comprising:

transmitting a roll back request from a processing unit to a snapshot mechanism implemented in hardware; and

initiating a transaction in which a snapshot of the current state is created of a file system volume in which, during the transaction, the file system operates normally.

25. The method of Claim 24, wherein transmitting the roll back request occurs after any host computer restart or any interruption of the file system.

26. The method of Claim 25, wherein the storage controller responds to the rollback request by restoring the point-in-time image represented by the snapshot volume to the file system volume.

27. The method of claim 26, further comprising the step of resetting or deleting the snapshot after all application-level file system activity completes.

28. The method of Claim 27, wherein the hardware is contained in the storage controller and comprises a microprocessor and a memory.